Course Number: ATOS-C1610 & ATOS-1719
OHLAP Credit: No
OCAS Code: None
Course Length: 95 Hours
Career Cluster: Transportation, Distribution & Logistics
Career Pathway: Automotive Service
Career Major(s): Automotive General Service Technician (NATEF compliant), Maintenance Light Repair Technician (NATEF Compliant)

Pre-requisite(s):

Course Description:
This course covers disc and drum braking system components, brake fluids, electrical controls and parking brakes systems.

The student will learn to diagnose and repair drum and disc brake systems. Also covered will be diagnosing and repairing the entire hydraulic brake system, which will include the master cylinder, lines, proportioning valves and stop light operation. The student will learn to diagnose and repair power assist units. Finally this course will cover diagnosis and service of wheel bearings, to include how to replace bearings and races, as well as clean, repack and adjust wheel bearing preload.

The student will learn to diagnose service and repair the Anti-lock Brake System (ABS). ABS braking concerns caused by vehicle modifications, such as tire size, curb weight and change of final drive ratios will also be covered.


Course Objectives:

A. Complete Introduction to Brakes.
1. Review brake safety and pass safety test with 100% accuracy.
2. Discuss knowledge of brake tools and equipment.
3. Demonstrate proper usage of brake tools and equipment.
4. Identify components of a brake system and their function.
5. Explain the principles of friction, and how it provides braking action.
6. Discuss the advantage of a dual braking system.
7. Identify and discuss different types of brake fluid.
8. Select, handle and fill brake fluids to proper level.
9. Identify brake system components.
10. Identify the purpose and types of brake lines and fittings.
11. Describe the different designs of brake pedals.
12. Compare mechanical and hydraulic switches.
13. List the basic parts of a wheel cylinder.
14. Discuss the operation of wheel cylinders and calipers.

B. General Brake System Diagnosis

1. Identify and interpret brake system concerns; determine necessary action. P-1
2. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins. P-1

3. Describe procedure for performing a road test to check brake system operation; including an anti-lock brake system (ABS). P-1

4. Install wheel and torque lug nuts. P-1

C. Demonstrate Knowledge of Hydraulics Systems and Maintenance

1. Diagnose pressure concerns in the brake system using hydraulic principles (Pascal's Law). P-1

2. Measure brake pedal height, travel, and free play (as applicable); determine necessary action. P-1

3. Check master cylinder for internal/external leaks and proper operation; determine necessary action. P-1

4. Remove, bench bleed, and reinstall master cylinder. P-1

5. Diagnose poor stopping, pulling or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action. P-3

6. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, and wear; check for loose fittings and supports; determine necessary action. P-1

7. Replace brake lines, hoses, fittings, and supports. P-2

8. Fabricate brake lines using proper material and flaring procedures (double flare and ISO types). P-2

9. Select, handle, store, and fill brake fluids to proper level. P-1

10. Inspect, test, and/or replace components of brake warning light system. P-3

11. Identify components of brake warning light system. P-2

12. Bleed and/or flush brake system. P-1

13. Test brake fluid for contamination. P-1

D. Drum Brake Diagnosis and Repair

1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. P-1

2. Remove, clean, inspect, and measure brake drum diameter; determine necessary action. P-1

3. Refinish brake drum and measure final drum diameter; compare with
AUTOMOTIVE BRAKES (NATEF Compliant)

specifications. P-1

4. Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. P-1

5. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. P-2

6. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments. P-2

E. Disc Brake Inspection, Diagnosis and Maintenance

1. Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation concerns; determine necessary action. P-1

2. Remove and clean caliper assembly; inspect for leaks and damage/wear to caliper housing; determine necessary action. P-1

3. Clean and inspect caliper mounting and slides/pins for proper operation, wear, and damage; determine necessary action. P-1

4. Remove, inspect, and replace pads and retaining hardware; determine necessary action. P-1

5. Lubricate and reinstall caliper, pads, and related hardware; seat pads and inspect for leaks. P-1

6. Clean and inspect rotor, measure rotor thickness, thickness variation, and lateral run-out; determine necessary action. P-1

7. Remove and reinstall rotor. P-1

8. Refinish rotor on vehicle; measure final rotor thickness and compare with specifications. P-1

9. Refinish rotor off vehicle; measure final rotor thickness and compare with specifications. P-1

10. Retract and re-adjust caliper piston on an integral parking brake system. P-3

11. Check brake pad wear indicator; determine necessary action. P-2

12. Describe importance of operating vehicle to burnish/break-in replacement brake pads according to manufacturer's recommendations. P-1

F. Power-Assist Units Diagnosis and Repair

1. Check brake pedal travel with, and without, engine running to verify proper power booster operation. P-2
2. Check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.  P-1

3. Inspect vacuum-type power booster unit for leaks; inspect the check-valve for proper operation; determine necessary action.  P-1

4. Inspect and test hydraulically-assisted power brake system for leaks and proper operation; determine necessary action.  P-3

5. Measure and adjust master cylinder pushrod length.  P-3

G. Miscellaneous (Wheel Bearings, Parking Brakes, Electrical, Etc.) Diagnosis and Repair

1. Diagnose wheel bearing noises, wheel shimmy, and vibration concerns; determine necessary action. P-3

2. Remove, clean, inspect, repack, and install wheel bearings; replace seals; install hub and adjust bearings.  P-1

3. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.  P-2

4. Check parking brake operation and parking brake indicator light system operation; determine necessary action.  P-1

5. Check operation of brake stop light system.  P-1

6. Replace wheel bearing and race.  P-2

7. Inspect and replace wheel studs.  P-1

8. Remove and reinstall sealed wheel bearing assembly.  P-2

H. Electronic Brake, Traction and Stability Control Systems Diagnosis and Repair

1. Identify and inspect electronic brake control system components; determine necessary action.  P-1

2. Identify traction control/vehicle stability control system components.  P-3

3. Describe the operation of a regenerative braking system.  P-3
1ASE objective
All unmarked objectives are TTC instructor developed.

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures:
1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.

Description of Classroom, Laboratories, and Equipment:
Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/College Credit: The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility: The student must maintain a grade point average of 2.0 or better.